

SIDE-BLOWN FAN

BACKGROUND OF THE INVENTION

1. Field of the invention

5 **[0001]** The invention relates to a side-blown fan and, more particularly, to a side-blown fan with reduced air leakage and an increased air pressure.

2. Description of the Related Art

10 **[0002]** In a system requiring a high back pressure, a blower is conventionally used to provide a higher air pressure for the system so that a higher back pressure may be obtained in the system. FIG. 1 is a schematic illustration showing a conventional blower. Referring to FIG. 1, a blower 100 is constituted of an upper case 102a, a blade member 106 and a lower case 102b. The upper case 102a has an axial inlet 104, the lower case 102b has an axial inlet 110, and a high air pressure region 108 exists between the blade member 106 and the upper and lower cases 102a and 102b. In addition, a side-outlet 112 is formed when the upper case 102a and the lower case 102b are combined.

15 **[0003]** In the above-mentioned structure, the upper and lower cases 102a and 102b and an outer periphery of the blade member 106 defines a region serving as a flow field 114 for the blower 100. Since the upper and lower cases 102a and 102b almost do not cover the blade member 106, when the rotating speed of the blade member 106 is gradually increased, the air stream flowing in the flow field 114 tends to overflow from the inlets 104, 110, and pressure leakage and air leakage may occur. Accordingly, the air pressure cannot be further increased.

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BRIEF SUMMARY OF THE INVENTION

[0004] It is therefore an object of the invention to provide a side-blown fan to greatly increase the operational air pressure.

[0005] To achieve the above-mentioned object, the invention provides a side-blown fan formed by a case and a blade member. The case includes a side-outlet, an axial inlet, and a protrusion extending from an edge of the axial inlet toward the center of the axial inlet. The blade member is embedded inside the case. A high air pressure region exists between the blade member and the case in a radial direction. The protrusion covers the high air pressure region and a part of the blade member.

[0006] Also, the side-blown fan of the invention may further include another axial inlet and another protrusion, which are formed on another side surface corresponding to the first axial inlet and the first protrusion. Furthermore, the case of the side-blown fan of the invention may also be constituted of a plurality of case elements.

[0007] In the side-blown fan of the invention, the protrusion covers the high air pressure region and a part of the blade member. Therefore, when the side-blown fan is in operation, the air traveling within the flow field of the side-blown fan will not overflow from the flow field, and the operational air pressure may be greatly increased.

[0008] In addition, in the side-blown fan of the invention, since the protrusion extends from the edge of the axial inlet toward the center, the dimension of the axial inlet is slightly reduced. However, the operational air pressure may be greatly increased within the range of the specific air flow.

[0009] Other objects, features, and advantages of the invention will become apparent from the following detailed description of the preferred embodiment with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG 1 is a schematic illustration showing a conventional blower.

[0011] FIG 2 is a schematic illustration showing a side-blown fan in accordance with a preferred embodiment of the invention, wherein the protrusion is a chord edge.

[0012] FIG 3 is a schematic illustration showing a part of a side-blown fan in accordance with a preferred embodiment of the invention, wherein the protrusion is a bump.

[0013] FIG 4 is a graph showing curves of airflow versus air pressure of the side-blown fan in accordance with the preferred embodiment of the invention and a conventional blower.

DETAILED DESCRIPTION OF THE INVENTION

[0014] A side-blown fan of the invention will be described in the form of a blower. Referring to FIG 2, a side-blown fan 200 of the invention is formed by a case 202 and a blade member 208, wherein a high air pressure region 210 exists between the blade member 208 and the case 202.

[0015] The case 202 has a side-outlet 214, axial inlets 204 and 212, and protrusions 206a and 206b. The protrusions 206a and 206b extend from edges of the axial inlets 204 and 212 toward the centers of the axial inlets 204 and 212, respectively. The axial inlets 204 and 212 correspond to each other, and the protrusions 206a and 206b also correspond to each other.

The case 202 is made from, for example, a plastic, metallic or composite material. Also, the case 202 can be formed by way of injection molding, press forming, cutting, or the like. In one embodiment, case elements 202a and 202b are formed by way of injection molding and then

combined. In addition, each of the axial inlets 204 and 212 may be shaped to be substantially circular.

[0016] The case elements 202a and 202b may be combined by way of clamping, riveting, engaging, adhering, or the like. Specifically, the case element 202a has extending hooking structures and the case element 202b has corresponding eye structures so that the hooking structures and the eye structures are engaged to combine the case elements 202a and 202b. Alternatively, in another embodiment, the case element 202a has extending U-shaped structures and the case element 202b has corresponding bump structures so that the U-shaped structures and the bump structures are engaged to combine the case elements 202a and 202b.

[0017] The blade member 208 is embedded inside the case 202, and has a plurality of blades 216 and a driving device (not shown) for driving the blades 216. In the radial direction, a flow field 218 exists between the blade member 208 and the case 202, wherein there is a high air pressure region 210 in the flow field 218. The high air pressure region 210 means a narrower region existing between the blade member 208 and the case 202 in the radial direction. Specifically, the high air pressure region 210 is a flow region extending from the narrowest section of the flow field 218 to a section at a prescribed distance of the flow field 218 along the direction of the operational air stream inside the case 202. The prescribed distance depends on requirements in actual practice.

[0018] The protrusions 206a and 206b cover the high air pressure region 210 and a part of the blade member 208, wherein the range of the specific region varies according the required air pressure. The protrusion 206a (or 206b), as shown in FIG 2, can be a chord edge of the circular axial inlets 204 (or 212). Alternatively, the protrusion can be a bump 206c as shown in FIG 3.

[0019] In the side-blown fan 200, the high air pressure region 210 covered by the

protrusions 206a and 206b exists between the axial inlets 212 and 204. Accordingly, when the overflowing air pressure is reached, the operational air stream will be blocked by the protrusions 206a and 206b and still flow within the flow field 218, thereby preventing the air leakage. Therefore, a higher operational air pressure can be obtained under the same rotating speed, and even the rotating speed of the fan may be further increased to get a higher operational air pressure.

[0020] Next, the effect of the side-blown fan of the invention will be described with reference to FIG. 4, which shows curves of air flow vs. air pressure of the side-blown fan according to the preferred embodiment of the invention and a conventional blower. Referring to FIG. 4, the solid line represents a curve of air flow vs. air pressure of the side-blown fan in accordance with the preferred embodiment of the invention, while the dashed line represents a curve of air flow vs. air pressure of the conventional blower.

[0021] It can be seen from FIG. 4 that when the required air flow is smaller than about 0.158 m³/min (indicated by a symbol “+” in the drawing), the operational air pressure of the side-blown fan of the invention is higher than that of the conventional blower. When the operational airflow is getting smaller and smaller, the operational air pressure of the side-blown fan of the invention may be significantly increased.

[0022] In the side-blown fan of the invention, since the protrusion covers the high air pressure region 210 and a part of the blade member 208, when the side-blown fan is in operation, the air traveling within the flow field of the side-blown fan will not overflow from the flow field, and the operational air pressure can be greatly increased.

[0023] In addition, in the side-blown fan of the invention, since the protrusion extends from the edge of the axial inlet toward the center, the dimension of the axial inlet is slightly reduced. However, the operational air pressure may be greatly increased within the range of the specific

airflow.

[0024] Moreover, although the case 202 in accordance with the embodiment of the invention is formed by combining at least two case elements, the case 202 may also be integrally formed.

5 [0025] Furthermore, although the case 202 of the invention has two axial inlets in accordance with the embodiment, the case 202 may have only one axial inlet.

[0026] While the invention has been described by way of an example and in terms of a preferred embodiment, it is to be understood that the invention is not limited to the disclosed embodiment. To the contrary, it is intended to cover various modifications. Therefore, the
10 scope of the appended claims should be accorded the broadest interpretation so as to encompass all such modifications.